

494310



10822 WEST TOLLER DRIVE
LITTLETON, COLORADO U.S.A. 80127
PHONE: (303) 948-4000/FAX: (303) 948-4010

November 1, 1999

Ms. Bonnie Lavelle
USEPA, Region 8
999 18th Street, Suite 500
Denver, CO 80202-2466

RE: Columbia Analytical Services MDL Study
Vasquez Boulevard/Interstate 70 (VB/I70) Site
Work Assignment 004-RICO-089R

Dear Bonnie,

Enclosed is a copy of the MDL study performed by Columbia Analytical Services for arsenic and lead by EPA Method 6020. The MDL study was performed on a water sample and MDLs for tissues were calculated based on the amount of sample normally digested. A MDL of 0.05 mg/Kg in tissue will be achieved by digesting more sample than is normally digested (see the calculation on Columbia's fax cover sheet).

We plan to send the vegetable samples to Columbia Analytical Services on Wednesday, November 3rd. If you have any questions, please call me at (303) 948-4674.

Sincerely,

A handwritten signature in black ink that reads "Ellen McEntee".

Ellen McEntee
Project Chemist

Enc.

cc: Marta Valentine



FAX

Date: 11-1-99Pages: 8 (including cover sheet)From: Howard Borse
Columbia Analytical ServicesTo: ELLEN McENTEE
Morrison & Knudsen

Phone: _____

Fax: _____

CC: _____

1317 South 13th Ave.

P.O. Box 479
Kelso, WA 98626Phone: (360) 577-7222Fax: (360) 636-1068

Phone: _____

Fax: 303-948-4010

$$\frac{0.2 \text{ } ^{\text{49}}\text{/L} \times 0.02 \text{ L}}{0.200 \text{ grams Dry}} \times 2 = 0.04 \text{ } ^{\text{49}}\text{/g}$$

0.2 grams of dry sample will be used.
≈ 0.1 grams normally digested

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1999 6020/200.8/1638 MRL & MDL Summary

Analyte	Water (ug/L) CLP Digestion		Water (ug/L) EPA 3020A Digestion		Soil/Sediment (mg/kg) EPA 3050B Digestion		Tissue (mg/kg) PSEP Digestion	
	MRL	MDL	MRL	MDL	MRL	MDL	MRL	MDL
Aluminum	1	0.8	1	0.5	1	0.6	1	0.4
Antimony	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01
Arsenic	0.5	0.2	0.5	0.2	0.5	0.2	0.5	0.1
Barium	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01
Beryllium	0.02	0.02	0.02	0.008	0.02	0.009	0.02	0.01
Boron	0.5	0.2	0.5	0.3	1	0.7	1	0.1
Cadmium	0.02	0.02	0.02	0.04	0.02	0.02	0.02	0.01
Chromium	0.2	0.07	0.2	0.06	0.2	0.05	0.2	0.04
Cobalt	0.02	0.009	0.02	0.005	0.02	0.01	0.02	0.005
Copper	0.1	0.05	0.1	0.05	0.1	0.03	0.1	0.03
Lead	0.02	0.008	0.02	0.007	0.02	0.02	0.02	0.004
Manganese	0.05	0.04	0.05	0.03	0.05	0.02	0.05	0.02
Molybdenum	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.02
Nickel	0.2	0.05	0.2	0.04	0.2	0.2	0.2	0.03
Selenium	1	0.5	1	0.6	1	0.6	1*	1*
Silver	0.02	0.02	0.02	0.02	0.02	0.004	0.02	0.01
Thallium	0.02	0.02	0.02	0.004	0.02	0.004	0.02	0.01
Tin	0.1	0.02	0.1	0.02	-	-	-	-
Uranium	0.02	0.003	0.02	0.004	0.02	0.004	0.02	0.002
Vanadium	0.2	0.09	0.2	0.03	0.2	0.04	0.2	0.05
Zinc	0.5	0.08	0.5	0.07	0.5	0.2	0.5	0.04

* Selenium analysis for tissue samples is performed by GFAA, EPA Method 7740.

Columbia Analytical Services
Method Detection Limit Study

Analytical Method: EPA 200.8, 6020, 1638
 Extr./Dig. Method: EPA 3020A
 Matrix: Water
 Units: µg/L (ppb)
 Analyst(s): Eric Moen
 Instrument: PQ-T

Sample ID: MDL-1 MDL-2 MDL-3 MDL-4 MDL-5 MDL-6 MDL-7 MDL-8 MDL-9 MDL-10
 Date Analyzed: 3/12/99 3/12/99 3/12/99 3/12/99 3/12/99 3/12/99 3/12/99 3/12/99 3/12/99 3/12/99

Analyte:	Spike Level:	Result									
		1	2	3	4	5	6	7	8	9	10
Aluminum	1.0	1.531	1.717	1.701	1.947	2.01	1.625	1.749	1.6810	1.576	1.632
Antimony	0.02	0.0528	0.0523	0.0523	0.0525	0.0539	0.048	0.0487	0.0638	0.0671	0.0628
Arsenic	0.50	0.3973	0.3267	0.3493	0.3437	0.3662	0.3423	0.3197	0.2847	0.2881	0.288
Barium	0.02	0.0279	0.0227	0.0231	0.0237		0.0239	0.0247	0.0352	0.0255	0.0384
Beryllium	0.05	0.0399	0.0446	0.0373	0.0418	0.046	0.0409	0.0422	0.0404	0.0436	0.0448
Boron	1.0	1.285	1.481	1.372	1.46	1.441	1.446	1.495	1.4290	1.217	1.272
Cadmium	0.05	0.0544	0.0439	0.043	0.0389	0.0614	0.048	0.0628	0.0688	0.0553	0.0679
Chromium	0.10	0.1989	0.2072	0.2128	0.2484	0.2391	0.1947	0.2433	0.2077	0.2394	0.2357
Cobalt	0.05	0.0478	0.0467	0.0467	0.046	0.0452	0.0488	0.0461	0.0430	0.0451	0.0461
Copper	0.05	0.0253	0.0111	0.0325	0.0244	0.0445	0.0201	0.054	0.0231	0.0479	0.0469
Lead	0.02	0.0242	0.026	0.026	0.0227	0.0274	0.0242	0.028	0.0233	0.0269	0.0299
Manganese	0.05	0.0187	0.008	0.0127	0.0184	0.0133	0.018	0.0342	0.0115	0.0167	0.0212
Molybdenum	0.05	0.0689	0.062	0.063	0.0588	0.059	0.0557	0.062	0.0583	0.0668	0.0709
Nickel	0.10	0.0908	0.0845	0.0842	0.0832	0.0991	0.0745	0.0936	0.0794	0.0979	0.1163
Selenium	1.0	0.452	0.4254	0.4396	0.1968	0.4485	0.5762	0.3177	0.1807	0.1084	-0.1312
Silver	0.02	0.0271	0.0291	0.0293	0.0268	0.0394	0.0257	0.0259	0.0350	0.0304	0.0316
Thallium	0.02	0.0204	0.022	0.0235	0.0224	0.0235	0.0225	0.0237	0.0223	0.0244	0.0213
Tin	0.05	0.05	0.0523	0.0479	0.0472	0.0505	0.0499	0.0648	0.0498	0.055	0.0564
Uranium	0.02	0.0232	0.0205	0.0198	0.0189	0.0193	0.0213	0.0196	0.0218	0.019	0.0213
Vanadium	0.10	0.1184	0.1266	0.1242	0.136	0.1308	0.1083	0.1279	0.1144	0.1197	0.1289
Zinc	0.10	0.0857	0.0931	0.0918	0.095	0.1077	0.1004		0.1057	0.1168	0.1601

Supervisor Approval _____

QA/QC Approval _____

Columbia Analytical Services
Method Detection Limit Study

Analytical Method: EPA 200.8, 60
 Extr./Dig. Method: EPA 3020A
 Matrix: Water
 Units: µg/L (ppb)
 Analyst(s): Eric Moen
 Instrument: PQ-T

Sample ID:
 Date Analyzed:

Analyte:	Spike Level:				Calc.	Reported	Average		MDL Qualifier notes
		Mean	Std Dev.	T-Value	MDL	MDL	% RSD	% Rec.	
Aluminum	1.0	1.717	0.153	2.821	0.432	0.5	9%	172%	
Antimony	0.02	0.055	0.007	2.821	0.019	0.02	12%	277%	Valid MDL Data
Arsenic	0.50	0.331	0.037	2.821	0.104	0.2	11%	66%	Valid MDL Data
Barium	0.02	0.027	0.006	2.896	0.016	0.02	21%	136%	Valid MDL Data
Beryllium	0.05	0.042	0.003	2.821	0.007	0.008	6%	84%	Valid MDL Data
Boron	1.0	1.390	0.098	2.821	0.277	0.3	7%	139%	Valid MDL Data
Cadmium	0.05	0.054	0.011	2.821	0.030	0.04	20%	109%	Valid MDL Data
Chromium	0.10	0.223	0.020	2.821	0.057	0.06	9%	223%	Valid MDL Data
Cobalt	0.05	0.046	0.002	2.821	0.004	0.005	3%	92%	Valid MDL Data
Copper	0.05	0.033	0.014	2.821	0.041	0.05	44%	66%	Valid MDL Data
Lead	0.02	0.026	0.002	2.821	0.006	0.007	9%	129%	Valid MDL Data
Manganese	0.05	0.017	0.007	2.821	0.020	0.03	41%	35%	Valid MDL Data
Molybdenum	0.05	0.063	0.005	2.821	0.014	0.02	8%	125%	Valid MDL Data
Nickel	0.10	0.090	0.012	2.821	0.034	0.04	13%	90%	Valid MDL Data
Selenium	1.0	0.301	0.212	2.821	0.598	0.6	70%	30%	Valid MDL Data
Silver	0.02	0.030	0.004	2.821	0.012	0.02	15%	150%	Valid MDL Data
Thallium	0.02	0.023	0.001	2.821	0.003	0.004	5%	113%	Valid MDL Data
tin	0.05	0.052	0.005	2.821	0.015	0.02	10%	105%	Valid MDL Data
Uranium	0.02	0.020	0.001	2.821	0.004	0.004	7%	102%	Valid MDL Data
Vanadium	0.10	0.124	0.008	2.821	0.023	0.03	7%	124%	Valid MDL Data
zinc	0.10	0.106	0.022	2.896	0.065	0.07	21%	106%	Valid MDL Data

Supervisor Approval _____

QA/QC Approval _____

PQT3020A.XLS

Degrees of freedom	Upper tail area (alpha)		
	0.025	0.01	0.005
97.50%	99.00%	99.50%	
1	12.706	31.821	63.657
2	4.303	6.965	9.925
3	3.182	4.541	5.841
4	2.776	3.747	4.604
5	2.571	3.365	4.032
6	2.447	3.143	3.707
7	2.365	2.998	3.499
8	2.306	2.896	3.355
9	2.262	2.821	3.25
10	2.228	2.764	3.169
11	2.201	2.718	3.106
12	2.179	2.681	3.055
13	2.16	2.65	3.012
14	2.145	2.624	2.997
15	2.131	2.602	2.947
16	2.12	2.583	2.921
17	2.11	2.567	2.898
18	2.101	2.552	2.878
19	2.093	2.539	2.861
20	2.086	2.528	2.845

Columbia Analytical Services
Method Detection Limit Study

Analytical Method: EPA 200.8, 6020, 1638
 Extr./Dig. Method: EPA 3050B
 Matrix: Soil
 Units: mg/Kg (ppm)
 Analyst(s): Greg Jasper
 Instrument: PQ-T

Sample ID:	MDL-1	MDL-2	MDL-3	MDL-4	MDL-5	MDL-6	MDL-7	MDL-8	MDL-9	MDL-10
Date Analyzed:	3/5/99	3/5/99	3/5/99	3/5/99	3/5/99	3/5/99	3/5/99	3/5/99	3/5/99	3/5/99

Analyte:	Spike Level:	Result									
		1	2	3	4	5	6	7	8	9	10
Aluminum	1.0	1.711	1.5495	1.751	1.7325	1.602	1.9845	1.726	1.61	1.6915	1.776
Antimony	0.02	-	0.05725	0.05375	0.0515	0.04615	0.0465	0.04755	0.05	0.0473	0.04205
Arsenic	0.50	0.4678	0.40625	0.4973	0.4904	0.4201	0.44725	0.454	0.43	0.4885	0.4467
Barium	0.02	0.02755	0.0283	0.03035	0.02985	0.0269	0.02605	0.02695	0.03	0.04775	0.029
Beryllium	0.05	0.0395	0.0424	0.04185	0.04435	0.04075	0.04495	0.0421	0.04	0.04105	0.0448
Boron	1.0	1.734	1.417	1.3315	1.334	1.1145	1.616	1.356	1.33	1.6825	1.777
Cadmium	0.05	0.05325	0.04695	0.04985	0.03845	0.0407	0.05	0.0441	0.05	0.03695	0.043
Chromium	0.10	0.1352	0.13005	0.1401	0.1463	0.12505	0.11255	0.10745	0.10	0.12285	0.1056
Cobalt	0.05	0.03655	0.0422	0.0421	0.0437	0.0415	0.046	-	0.04	0.04215	-
Copper	0.05	-	0.06875	0.0725	0.07225	-	0.06925	0.066	0.06	0.08105	0.05155
Lead	0.02	-	0.0321	0.0399	0.0333	0.02645	0.02645	0.0251	0.03	0.02705	0.0318
Manganese	0.05	0.06895	0.06785	0.08045	0.068	0.06715	0.0649	0.0716	0.07	0.0776	0.0769
Molybdenum	0.05	0.0528	0.0492	0.05345	0.0527	0.05475	0.0566	0.05275	0.05	0.0565	0.05215
Nickel	0.10	-0.1317	-0.1692	-0.1515	-	-	-0.0972	-0.0939	-0.18	-0.0953	-0.1271
Selenium	1.0	0.718	0.45975	0.944	1.028	0.551	0.606	0.676	0.58	0.9315	0.6375
Silver	0.02	0.01635	0.0149	0.01635	0.01345	0.01465	0.015	0.01555	0.01	0.0148	0.0132
Thallium	0.02	0.0195	0.0207	-	0.01985	0.01775	0.0171	0.01875	0.02	0.019	0.0173
Uranium	0.02	0.02015	0.02185	0.02135	0.01915	0.02155	0.0209	0.02315	0.02	0.0201	0.0214
Vanadium	0.10	0.0947	0.09585	0.10105	0.0967	0.09075	0.0937	0.08795	0.08	0.08165	0.08665
Zinc	0.10	0.0728	0.05305	0.12015	0.05085	0.04005	0.05665	0.0527	0.04	0.042	0.03085

Supervisor Approval _____

QA/QC Approval _____

Columbia Analytical Services
Method Detection Limit Study

Analytical Method: EPA 200.8, 60
 Extr./Dig. Method: EPA 3050B
 Matrix: Soil
 Units: mg/Kg (ppm)
 Analyst(s): Greg Jasper
 Instrument: PQ-T

Sample ID:
 Date Analyzed:

Analyte:	Spike Level:	Calculated Data				Reported Data		Average		MDL Qualifier notes
		Mean	Std Dev.	T-Value	MDL	MDL	% RSD	% Rec.		
Aluminum	1.0	1.714	0.120	2.821	0.338	0.4	7%	171%		
Antimony	0.02	0.049	0.005	2.896	0.013	0.02	9%	244%	Valid MDL Data	
Arsenic	0.50	0.454	0.031	2.821	0.089	0.09	7%	91%	Valid MDL Data	
Barium	0.02	0.030	0.006	2.821	0.018	0.02	22%	149%	Valid MDL Data	
Beryllium	0.05	0.042	0.002	2.821	0.005	0.006	4%	85%	Valid MDL Data	
Boron	1.0	1.469	0.218	2.821	0.616	0.7	15%	147%	Valid MDL Data	
Cadmium	0.05	0.045	0.005	2.821	0.015	0.02	12%	90%	Valid MDL Data	
Chromium	0.10	0.122	0.016	2.821	0.044	0.05	13%	122%	Valid MDL Data	
Cobalt	0.05	0.041	0.003	2.998	0.010	0.01	8%	83%	Valid MDL Data	
Copper	0.05	0.068	0.009	2.998	0.026	0.03	13%	135%	Valid MDL Data	
Lead	0.02	0.030	0.005	2.896	0.014	0.02	16%	150%	Valid MDL Data	
Manganese	0.05	0.071	0.005	2.821	0.015	0.02	8%	142%	Valid MDL Data	
Molybdenum	0.05	0.053	0.003	2.821	0.008	0.008	5%	106%	Valid MDL Data	
Nickel	0.10	-0.131	0.034	2.998	0.101	0.2	-26%	-131%	Valid MDL Data	
Selenium	1.0	0.713	0.190	2.821	0.537	0.6	27%	71%	Valid MDL Data	
Silver	0.02	0.015	0.001	2.821	0.003	0.004	8%	74%	Valid MDL Data	
Tellurium	0.02	0.019	0.001	2.896	0.004	0.004	7%	93%	Valid MDL Data	
Uranium	0.02	0.021	0.001	2.821	0.004	0.004	6%	104%	Valid MDL Data	
Vanadium	0.10	0.091	0.006	2.821	0.017	0.02	7%	91%	Valid MDL Data	
Inc	0.10	0.056	0.025	2.821	0.072	0.08	46%	56%	Valid MDL Data	

Supervisor Approval _____

QA/QC Approval _____

PQT3050A.XLS

Degrees of freedom	Upper tail area (alpha)		
	0.025	0.01	0.005
97.50%	99.00%	99.50%	
1	12.706	31.821	63.657
2	4.303	6.965	9.925
3	3.182	4.541	5.841
4	2.776	3.747	4.604
5	2.571	3.365	4.032
6	2.447	3.143	3.707
7	2.365	2.998	3.499
8	2.306	2.896	3.355
9	2.262	2.821	3.25
10	2.228	2.764	3.169
11	2.201	2.718	3.106
12	2.179	2.681	3.055
13	2.16	2.65	3.012
14	2.145	2.624	2.997
15	2.131	2.602	2.947
16	2.12	2.583	2.921
17	2.11	2.567	2.898
18	2.101	2.552	2.878
19	2.093	2.539	2.861
20	2.086	2.528	2.845